Technology Opportunity

Advanced Computer and Digital Video Applications

The National Aeronautics and Space Administration (NASA) seeks to transfer expertise in computer-based augmentation of digitized video for improved data visualization and in computer applications of advanced video systems such as high-definition television (HDTV).

Potential Commercial Uses

- Flow visualization in fluids and gases
- Process-analysis by visually correlating video with sensor and/or event data
- Analysis of high-resolution, moving images

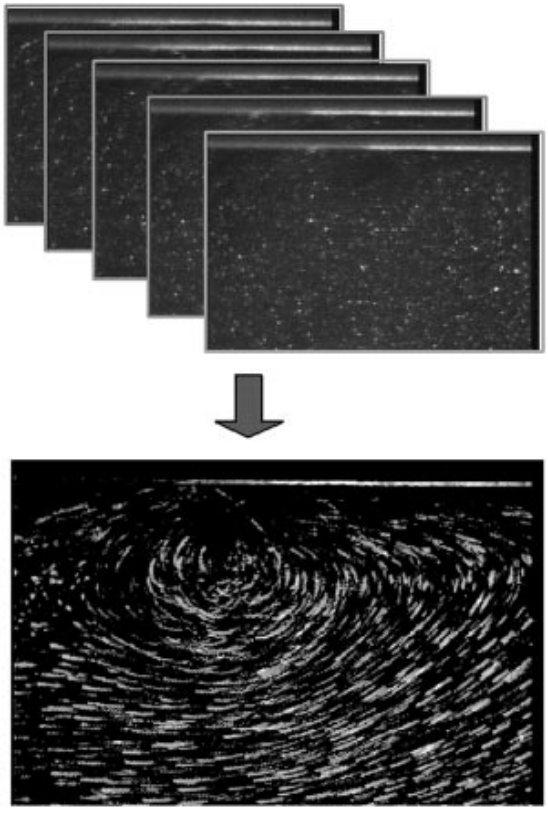
Benefits

- Increased insight into processes can be gained by visual representation of relationships between different types of data.
- Individualized programs to process video and other data can meet needs that cannot be met by off-the-shelf systems.
- Companies can benefit from NASA's experiences with emerging, advanced video technologies.
- HDTV allows data visualization at graphic workstation resolution without color artifacts or loss of visual detail.
- Companies have the advantage of a head-start in developing applications that will be even more cost-effective on next-generation multimedia computers.

The Technology

The merging of video and computer technologies provides unique methods of imaging the data and processes used in research and manufacturing. Typically, a videotape is converted to digital images, processed by computer, and transferred back to video. This can be done in real time if the per-frame processing can be done within the video frame rate of 1/30 sec, but more often the process involves reading and writing to large amounts of disk storage.

The example illustrated in the figure is a technique for enhanced visualization of a moving fluid vortex. The original black-and-white video recorded the motion of tracer particles in the fluid. A series of sequential still images were colored and merged to create a moving, 'virtual' time-exposure. The size



A series of video images of tracer particles in a fluid (upper images) are combined to create a "virtual" time-lapse video of fluid flow.

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and color of the resultant streaks not only give information on the velocity and direction of flow at any point in the fluid, but also enhance the appearance of the vortex.

Another technique that has been developed overlays computer-generated images of sensor and event data onto camera-based video images for improved representation of complex processes.

In addition, NASA Lewis has interfaced image-processing and graphic computers with HDTV systems whose 1920- by 1035-pixel images allow data visualization at higher resolution than the standard 640- by 480-pixel video. Potential applications of HDTV include combined computer-generated and standard video, simultaneous viewing of multiple video images, and animation of high-resolution electronic or scanned film images, such as x-rays.

Options for Commercialization

Options exist for consultations and demonstration of technology. Opportunities for customized application development or access to specialized equipment or facilities can be negotiated.

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Key Words

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